Animal movement across scales

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Book Review

***Animal Movement Across Scales*. Edited by Lars-Anders Hansson and Susanne Åkesson. Oxford, U.K.: Oxford University Press (2014). Pp. xiii+279. Price £39.99 paperback.**

For the last four decades, biologists at Lund University, in Skåne, southern Sweden, have consistently been at the forefront of research in bird migration, more recently extending their discoveries into other areas of evolutionary biology and to other groups of animals than birds. 'Animal movement' is a term that somehow covers most of what the organismal biologists in Lund do. This is why in 2008 they organized themselves into the Centre of Animal Movement Research (CAnMove), supported by the Swedish Research Council. In this book they synthesize and present their own views of the scientific field of animal movement. As a long-time follower and 'fan' of the movement research in Lund, I was excited to be presented with such a synthesis.

The book is structured in three sections. Rather than starting with the mechanistic basis that allows the huge diversity of movement phenomena, such as the physics and physiology of movement and the sensory and computational aspects of navigation, these topics are actually discussed last (in Part 3: 'The mechanisms and codes of navigation and movement'). The book starts off at the phenomenological, descriptive level (Part 1: Large-scale patterns of movement) and then deals with the functional, adaptive aspects of animal movement (Part 2: Movement strategies and adaptations). This second part includes a discussion of optimal migration models (thus long before a review of flight mechanics in Part 3), a discussion of phenotypic plasticity in the context of dispersal, and a discussion of 'animal personalities' in the context of both dispersal, metapopulation processes and partial migration. There is no doubt that the diversity of issues defies linear ordering, but more than once I was puzzled by the sequence in which information was presented, given that the aim of the book was to be accessible to 'a broader audience of professional biologists interested in animal movements and migrations' (from the back cover).

While some of the chapters gracefully deliver competent and cutting-edge accounts of subfields, the book left me struggling with what exactly is the novelty of this 'broad, cross-taxonomic approach to animal movement across both temporal and spatial scales' (also from the back cover) that is being claimed? Is animal movement perhaps such a multidimensional beast (almost as diverse and multivaried as biology itself) that it defies a unifying approach? And why, in such a book, was the earlier, high-profile attempt to establish a 'movement ecology paradigm' (Nathan et al., 2008) not used as the basis — of course one to be criticized, developed and so brought to greater maturity? I failed to find a single reference to this key paper. The problem with trying to be integrative without a clear framework is that it easily leads to hyperbole and to direct comparisons of entities that to me looked like very distinct 'apples' and 'pears'. The introduction and the general discussion chapters suffered from these problems.

The chapter on animal movement in agricultural landscapes was a good review of the issues of habitat fragmentation, but it failed to inform the curious reader about the ways in which modern agricultural landscapes differ from the 'natural' landscapes in which the movement strategies of most animals would have evolved. The explicitly evolutionary sections only considered the inheritance pathway of the genes, rather than even alluding to the exciting possibility that developmental and behavioural inheritance may allow faster evolutionary changes in movement strategies than 'genes only' (for the arguments, see Piersma (2011)). This is especially a gap in the light of the book's overall emphasis on questions about how moving animals will cope with global change.

These limitations did not hinder my appreciation of several individual chapters. I really enjoyed the highly readable, cutting-edge accounts on migration strategies, on individuality of movement, on the role of pathogens, and the two syntheses of animal navigation and the sensory mechanisms involved in navigation, respectively. In fact, the book may be at its best as a collection of expert statements, each chapter as a competent stand-alone section (and in fact every chapter has its own reference list).

I congratulate the movement biologists in Lund for having brought together their considerable expertise and insight in such an accessible form. That even after 40 years of massive and impressive research efforts at this centre of excellence in Lund, animal movement biology apparently still lacks a widely shared 'research paradigm' may indicate either (1) that animal movement is simply not a unified and integrated phenomenon and thus beyond help, or (2) that we have only started to scratch the surface of what that unified framework is. The jury is out, but I am sure that the biologists in the only academic building in the world with a bird radar on top, and a wind tunnel next to it, will contribute importantly to this debate.

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